



(11) Publication number : **0 595 602 A1**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : 93308538.3

(51) Int. Cl.⁵ : **B65D 71/70**

(22) Date of filing : 26.10.93

(30) Priority : 27.10.92 US 966981

(43) Date of publication of application :
04.05.94 Bulletin 94/18

(84) Designated Contracting States :
BE DE ES FR GB IT NL

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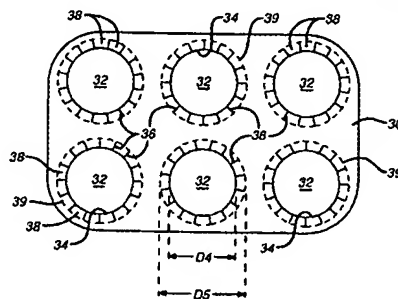
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(54) **Divider panel for two-tier can carton and carton incorporating such panel.**

(57) A carton for cans includes a plurality of cylindrical beverage cans arranged into a group of at least two vertically aligned tiers. A paperboard divider panel (30) is disposed within the carton and positioned between the cans in adjacent tiers. The divider panel includes a plurality of apertures (32), each of the apertures being defined by a substantially circular peripheral edge (34) concentric with the cylindrical axis of upper and lower cans and having a diameter (D4) smaller than the base of the upper can. A plurality of slits (36) extend radially outwardly from the circular edge of each aperture to a distance (D5) at least equal to the diameter of the top flange of the lower can to create a deformable peripheral margin which is displaced into the upper end of the lower one of a stacked pair of cans.

FIG. 3



The present invention relates to a divider panel for separating the tiers of a multi-tier can carton and to a carton which incorporates such a divider panel.

In modern beverage packaging, one of the most common forms of primary packaging is the drawn aluminum or steel can, for example, a can which contains twelve fluid ounces of beverage. Such cans include a substantially cylindrical side wall with a lower end formed integrally with the side wall and connected to the side wall along a relatively large radius of curvature to define a lowermost, substantially circular base. The base is domed inwardly in its central portion for improved pressure resistance. An upper end is connected to the side wall and seamed thereto along a substantially circular outer flange of a diameter greater than that of the base. The upper end includes a top surface recessed inwardly with respect to the uppermost portions of the flange.

It is common to market such beverage cans in secondary, paperboard packages containing a multiplicity of cans. Such cans are normally arranged in a single tier, with a common multiple being twelve cans, arranged in a 3 x 4 array. However, higher multiples such as 24 or more cans may also be packaged in a single carton. At such higher multiples, the carton can become awkwardly large in certain dimensions, and the single-tier arrangement also leaves four of six carton sides of relatively short height for the printing of graphics.

One solution to this problem is to package multiples of cans in two or more tiers. For example, a carton of 24 cans can be arranged as two tiers of 3 x 4 arrays in vertical alignment. Such a carton has the convenient configuration of a twelve-pack carton, but double-height graphic area on its sides.

A multiple-tier can carton is not without disadvantages, however. Modern, high-speed packaging equipment requires the loading of cartons through one or both ends of an open paperboard sleeve which thereafter has its ends closed. In many machines, this results in the sliding or other conveying movement of cans as they are loaded into the carton. For multiple-tiers, either the cans are moved in a stacked condition, or the cans of upper tiers must be moved over the cans of a prearranged lower tier. However, this is difficult as a result of the can construction described above, because the cans will tend to "nest" whereby the base of an upper-tier can fits within the circumferential limit defined by the top flange of a lower-tier can. This problem can be overcome by moving a group of stacked cans within the packaging machine, but the can-to-can contact and relative motion between stacked cans resulting in such an approach may be unsatisfactory.

A second solution to this problem is to place a divider panel between tiers of cans so that no vertical can-to-can contact occurs. Such an approach is generally known, as disclosed in US-A-3, 351,264. There,

a formed thermoplastic divider is used. However, especially for waste disposal and recycling reasons, it is preferable that the divider be made from a paperboard sheet. The disadvantage to this known solution is that while the outer carton may at first be tightly fitted about the stacked cans, over time the upper tier of cans will depress the paperboard divider panel into the recessed top panel of the lower tier of cans. This will in effect reduce the height of the carton contents, and thereby result in a looser carton.

What is needed, therefore, is a solution to the problem of separating multiple tiers of cans while avoiding the disadvantage resulting from collapse of the paperboard divider panel over time into the recessed portions of the cans upon which the divider panel rests. Of course, any such solution must not unduly complicate the packaging operation of the overall carton design or function.

One aspect of the present invention provides a carton in which a plurality of beverage cans is arranged into a group of at least two vertically-aligned tiers, said carton comprising a pair of side panels, a top panel foldably connected to upper ends of said side panels, and a bottom panel foldably connected to lower ends of said side panels; and comprising a divider panel disposed within said carton and positioned between said tiers, characterized in that said divider panel includes a plurality of apertures, each of said apertures being defined by a substantially circular peripheral edge, and wherein a plurality of slits extend radially outwardly from the said circular peripheral edge of each aperture to create a deformable peripheral margin which is displaced into the upper end of the lower one of a stacked pair of cans.

According to a feature of this aspect of the invention said exterior carton portion and said divider panel may be separate pieces.

According to another feature of this aspect of the invention each of said apertures may include a concentric substantially circular fold line interconnecting the radially outer ends of said slits. Preferably, the divider panel is formed from a paperboard material.

Another aspect of the present invention provides a divider panel for a carton sized to accommodate a plurality of beverage cans arranged into a group of at least two vertically-aligned tiers of cans, each can being of the type having a substantially cylindrical side wall a lower end connected to said side wall along a generally large radius of curvature and defining a lowermost substantially circular base of a first diameter, an upper end connected to said side wall and including a substantially circular outer flange of a second diameter which is greater than said first diameter and a top surface recessed inwardly with respect to said flange, said divider panel being adapted to be received between and in contact with said cans of adjacent ones of said tiers, characterized in that the divider panel includes a plurality of apertures one aper-

ture being provided for each stacked pair of cans in the group, each of said apertures having a substantially circular peripheral edge concentric with the axes of the stacked cans, said one aperture having a diameter smaller than said first diameter, and a plurality of slits extending radially outwardly from its circular peripheral edge to a distance at least equal to said second diameter and defining a deformable peripheral margin.

According to a feature of this aspect of the invention each of said can includes an opening means defined in the top surface thereof and confined within a notional circle concentric with the axis of said can and having a third diameter smaller than said first and second diameters, and wherein said substantially circular periphery edge of the divider panel may be of a diameter greater than said third diameter.

According to another feature of this aspect of the invention, each of said apertures may include a circular fold line concentric with the aperture and which interconnects the radially outer ends of said slits. Preferably the divider panel is formed from a paperboard material.

In use, the slits provide a plurality of tabs which create a deformable peripheral margin located between the lowermost portion of a can lower end and the recessed top surface of the can immediately beneath. This permits the tabs to collapse to fit the curvature of the can upper and lower ends, so that a carton sleeve corresponding to the collapsed height of the cans and divider panel may be used. No vertical reduction of carton contents will then occur within the loaded carton, and a tightly-packed carton will remain in such a condition.

In the package of the invention, each of the cans may include an opening means defined in the top surface and confined within a notional circle concentric with the cylindrical axis of the can and having a third diameter smaller than the first diameter, and wherein the circular edge is of a diameter greater than the third diameter.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is an elevational, partially sectional view of a typical beverage can as used with the present invention;

Figure 2 is a perspective view of a two-tier arrangement of cans for placement within a carton in accordance with the present invention, showing the divider panel positioned between the tiers;

Figure 3 is a plan view of the divider panel;

Figure 4 is a sectional view showing placement of the divider panel between a stacked pair of cans;

Figure 5 is a plan view of the outer surface of a blank from which a carton in connection with the present invention may be formed;

Figure 6 is an erected sleeve formed from the blank of Figure 5; and

Figure 7 is a completed package in accordance with the present invention.

The present invention is intended primarily for use with drawn aluminum or steel cans of the type used in packaging beverages. A typical example of such a can is shown in Figure 1 wherein can 10 includes a substantially cylindrical side wall 12 of diameter DC. The side wall has an integral lower end 14 which has a portion 16 connecting with side wall 12 which is of a relatively large radius of curvature. The bottommost surface of can 10 is domed inwardly.

The upper end of side wall 12 has a necked-in portion 18, to which is attached the upper can end 20, seamed onto the can side wall along a flange 22. The can end includes a top surface 24 which is recessed below flange 22 and a further recessed countersink 26 is positioned between surface 24 and flange 22 for added strength. A conventional opening means 28, such as an attached pull-tab, is provided in the central portion of surface 24, the central portion having diameter D3.

The lowermost portion of lower end 14 defines a substantially circular base for the can having a diameter D1. At the upper end 20 of the can flange 22 has a diameter D2 which is greater than the base diameter D1 although less than the overall can diameter DC. Hence $DC > D2 > D1$. Thus, when stacked, the can base will nest within the upper end of an underlying can so that either the base rests on top surface 24 or the curved connecting portion 16 rests against the inner surface of flange 22 of the underlying can and the deformable peripheral margin around each aperture of the divider panel will be caused to deform by virtue of and to reflect such nesting.

The opening means 28 is contained on top surface 24 within a notional circle of diameter D3 which is smaller than either D1 or D2. Hence, $DC > D2 > D1 > D3$.

A plurality of such cans 10 are loaded into a carton in a multi-tiered arrangement. An example of such a can arrangement can be seen by reference to Figure 2. As shown therein, two-tiers of six cans each are arranged to provide a package containing twelve cans. Of course, it will be appreciated that the invention may be used with any arrangement of cans for each tier and may also be used for can arrangements having greater than two tiers.

In order to eliminate metal-to-metal contact between the tops and bottoms of the stacked cans, a divider panel 30 is placed between the tiers of cans, resting upon the top surfaces of the cans in the lower tier, while receiving the bottoms of the cans in the upper tier. The divider panel 30 is shown in plan view in Figure 3. Panel 30 is provided with a plurality of apertures 32, one aperture for each stacked pair of cans in the can arrangement. As shown in Figure 3, divider

panel 30 is configured for use with the two-tier, cross-sectional area of a horizontal section of one tier of cans.

Each aperture 32 includes a circular peripheral edge 34. A plurality of radial slits 36 extend outwardly from each circular edge 34. Circular edge 34 defines a diameter D4 which exceeds the diameter D3 containing the opening means 28 for a can, but is smaller than the diameter D1 of the lower can end. The outermost portions of slits 36 define a diameter D5 which is at least as great as the diameter D2 of the flange 22 on the can upper end. Hence, $D5 > D2 > D1 > D4 > D3$.

The divider panel 30 is shown in partial cross-section, positioned between a pair of stacked cans in Figure 4. Because the diameter of the circular edge 34 exceeds that of the portion of the can upper end containing the opening means 28, divider panel 30 is not buckled or bulged as a result of any contact with the opening means 28. Since the diameter of circular edge 34 is smaller than that of the can lower end, paperboard material extends completely between the adjacent lower end of an upper can and upper end of a lower can, which would otherwise be in contact. The provision of slits 36 (not shown in Figure 4 but refer back to Figure 3) effectively define a plurality of tabs 38 which are displaced downwardly by the upper can as it is positioned on the lower can. This eliminates the downward compression of a solid divider panel under influence of the weight of the upper can, which would result in a disadvantageous reduction in the overall height of a completed can arrangement.

To further facilitate the downwardly folding movement of tabs 38 when positioned between cans, a circular fold line 39 may circumscribe the radially outer ends of slits 36 for each aperture 32.

To complete the package, the can arrangement and divider panel 30 shown in Figure 2 is placed into the interior of a sleeve-type carton, which may be an otherwise conventional carton used in the packaging of beverage cans.

A blank for one such carton may be seen by reference to Figure 5. The carton includes a bottom panel 40 and a top panel 42, each connected along fold lines 44 and 46 respectively to a side wall 48. At its opposite side, bottom panel 40 is connected along fold line 50 to partial side wall panel 52, while top panel 42 is connected along fold line 54 of partial side panel 56.

End closure structure, in part, is provided for the carton in the form of end flaps 58 and 60 which are foldably joined to the end edges of bottom wall 40 along fold lines 62 and 64 respectively. In addition, end flaps 66 and 68 are foldably joined to the end edges of top wall 42 along fold lines 70 and 72 respectively. End flaps 74 and 76 are foldably joined to the end edges of side wall 48 along fold lines 78 and 80 respectively. Additional end closure structure is provided in the form of partial end flaps 82 and 84 which

are foldably joined to the end edges of partial side wall 52 along fold lines 86 and 88 respectively. Likewise, partial end flaps 90 and 92 are foldably joined to the end edges of partial side wall 56 along fold lines 94 and 96 respectively.

Additional fold lines 100 are formed in end flaps 74 and 76 and partial end flaps 82, 84, 90 and 92 to define bevelled corner panels 102. In addition, each end flaps 74 and 76 and partial end flaps 82, 84, 90 and 92 are foldably interconnected by a web structure 104 to the adjacent one of end flaps 58, 60, 66 and 68. Each web structure 104 is defined by a fold line 105 which is substantially collinear with the fold line connecting the top or bottom panel 40 or 42 to the respective one of the side panels 48, 52 or 56. Web structure 104 is further defined by a fold line 106 which extends at an angle inwardly with respect to the corresponding one of end flaps 58, 60, 66 and 68.

Further details regarding the specific construction of the carton blank may be seen by reference to US-A-4,216,861.

The carton blank of Figure 5 may be erected into a tube as shown in Figure 6 by gluing the partial side panels 52 and 56 together to form a completed side wall. The tubular carton, as shown in Figure 6, may then be loaded with the can arrangement and divider plate through one or both of its ends as illustrated by arrows 108. The carton end flaps are then closed and glued into position using conventional methods, thereby producing the completed package shown in Figure 7. Further details regarding the folding sequence of the end flaps of the carton may be found by reference to the aforementioned US-A-4,216,861.

It will be appreciated that many variations may be made to the foregoing within the scope of the present invention. For example, different carton styles may be used, such as those having square or rounded corners rather than the bevelled corners as shown herein. Further, the carton design may be enhanced through the addition of handles, opening means and the like, again using structures known and understood within the art and/or may be made from different materials such as corrugate board.

It should be further appreciated that it would be possible to replace the single divider panel 30 with two or more divider panels, each being positioned between portions of the stacked can arrangement. Such an approach may be particularly useful where higher multiples of cans are desired to be placed within the carton, and/or where loading of the carton from both of its open ends is desired.

Claims

1. A carton in which a plurality of beverage cans is arranged into a group of at least two vertically-aligned tiers, said carton comprising a pair of side

panels, a top panel foldably connected to upper ends of said side panels, and a bottom panel foldably connected to lower ends of said side panels; and comprising a divider panel disposed within said carton and positioned between said tiers, characterized in that said divider panel includes a plurality of apertures, each of said apertures being defined by a substantially circular peripheral edge, and wherein a plurality of slits extend radially outwardly from the said circular peripheral edge of each aperture to create a deformable peripheral margin which is displaced into the upper end of the lower one of a stacked pair of cans.

2. A carton as claimed in claim 1, wherein said exterior carton portion and said divider panel are separate pieces. 15
3. A carton as claimed in claim 1 or claim 2, wherein each of said apertures includes a concentric circular fold line interconnecting the radially outer ends of said slits. 20
4. A carton as claimed in any of the preceding claims, wherein said divider panel is formed from a paperboard material. 25
5. A divider panel for a carton sized to accommodate a plurality of beverage cans arranged into a group of at least two vertically-aligned tiers of cans, each can being of the type having a substantially cylindrical side wall a lower end connected to said side wall along a generally large radius of curvature and defining a lowermost substantially circular base of a first diameter, an upper end connected to said side wall and including a substantially circular outer flange of a second diameter which is greater than said first diameter and a top surface recessed inwardly with respect to said flange, said divider panel being adapted to be received between and in contact with said cans of adjacent ones of said tiers, characterized in that the divider panel includes a plurality of apertures one aperture being provided for each stacked pair of cans in the group, each of said apertures having a substantially circular peripheral edge concentric with the axes of the stacked cans, said one aperture having a diameter smaller than said first diameter, and a plurality of slits extending radially outwardly from its circular peripheral edge to a distance at least equal to said second diameter and defining a deformable peripheral margin. 30 35 40 45 50
6. A divider panel as claimed in claim 5, wherein each of said cans includes an opening means defined in the top surface thereof and confined within a notional circle concentric with the axis of 55

said can and having a third diameter smaller than said first and second diameters, and wherein said substantially circular peripheral edge of the divider panel is of a diameter greater than said third diameter.

7. A divider panel as claimed in claim 5 or claim 6, wherein each of said apertures includes a circular fold line concentric with the aperture and which interconnects the radially outer ends of said slits.
8. A divider panel as claimed in any of claims 5 to 7, wherein said divider panel is formed from a paperboard material.

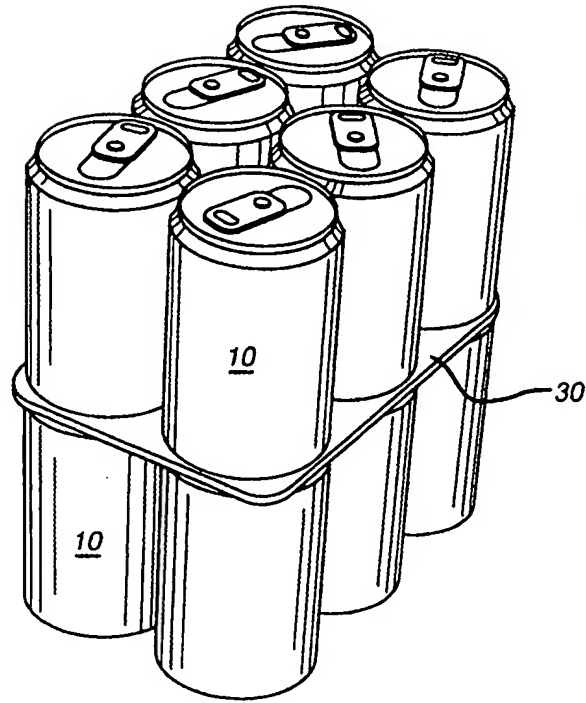


FIG. 2

FIG. 1

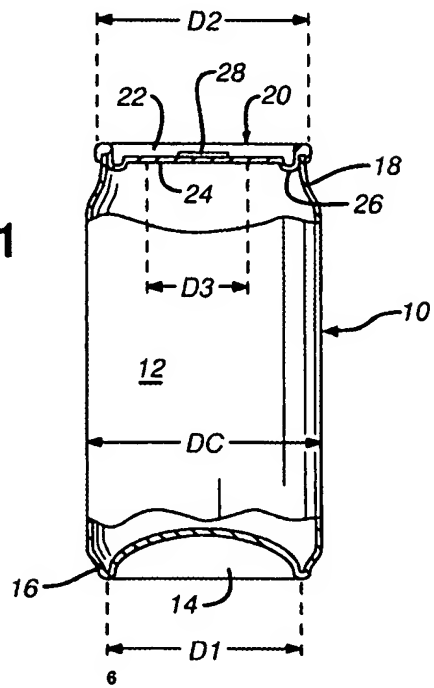


FIG. 3

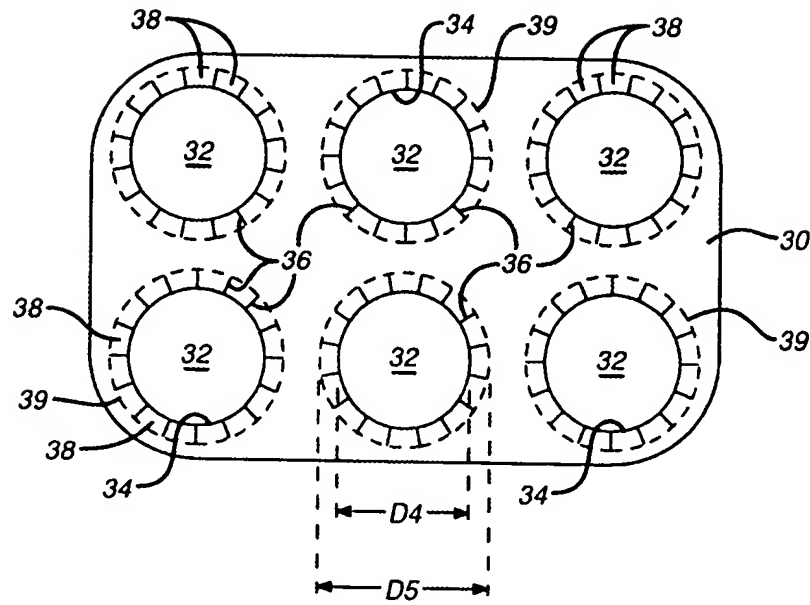


FIG. 4

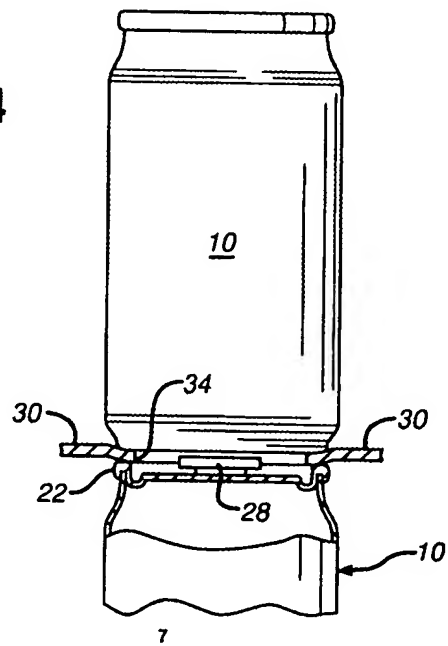


FIG. 5

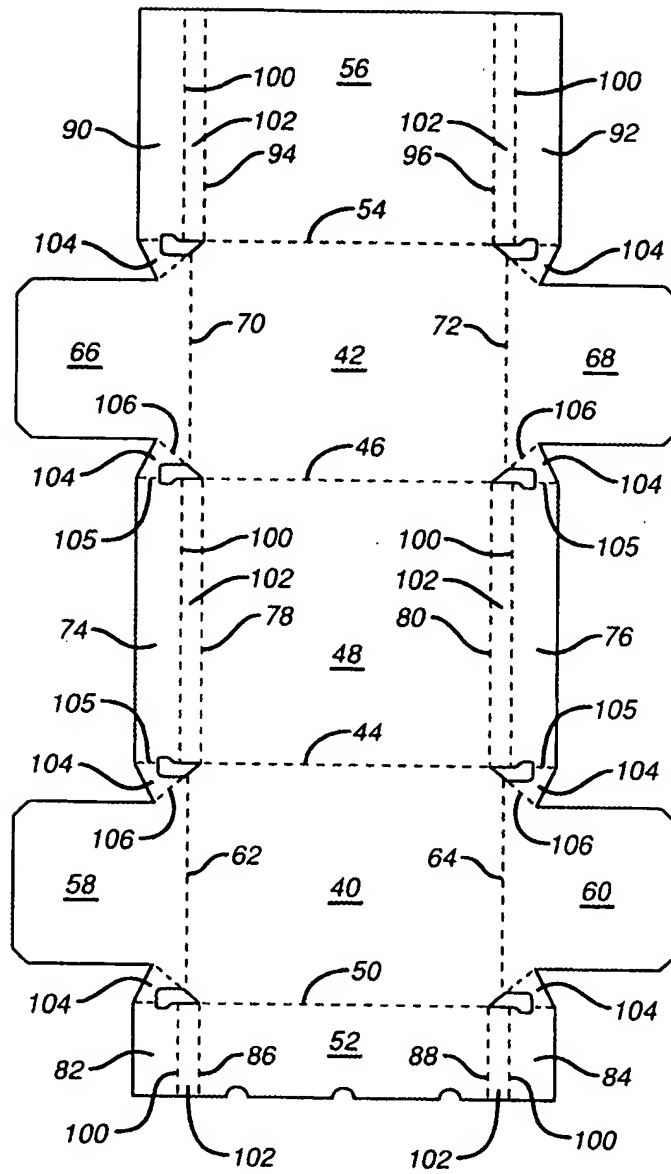


FIG. 6

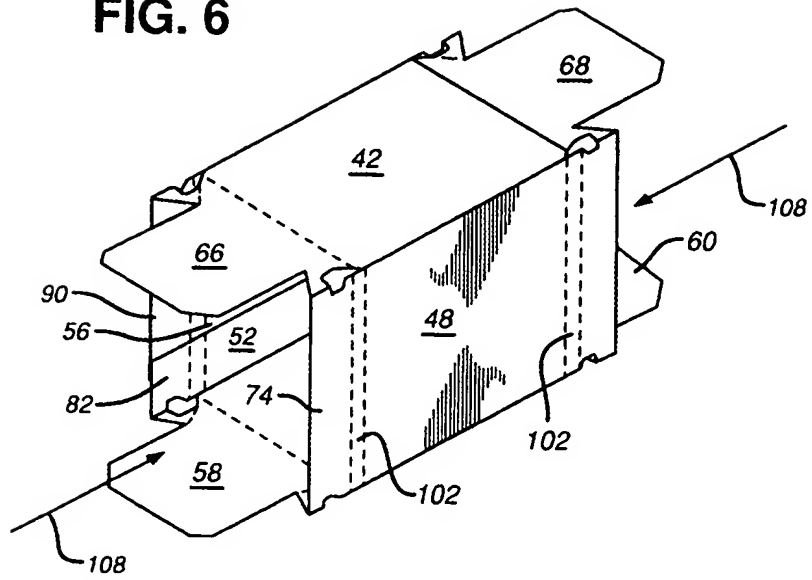
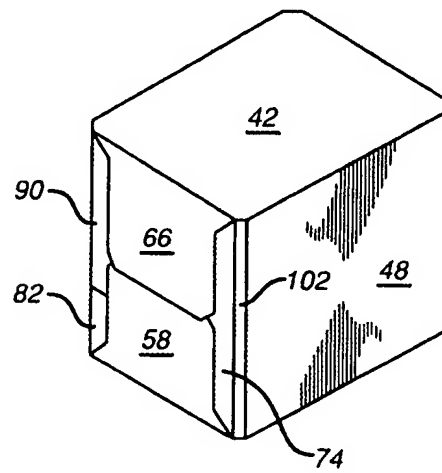


FIG. 7



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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 8538

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	EP-A-0 260 055 (INTERNATIONAL CONTAINER SYSTEMS INC.) * column 11, line 1 - line 56; figures 1,6 *	1,2,5	B65D71/70
A	US-A-2 739 705 (J.I. PRITCHETT ETAL) * the whole document * -----	1,2,5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			B65D
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 26 January 1994	Examiner Deprun, M
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